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(34) Connection device, especially for peritoneal dialysis.

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## Description

### Field of the Invention

Invention relates to devices intended to join and separate mating connectors, particularly in the medical field.

### Background of the Invention

In various fields, there is a need to repeatedly make and break connections between mating connectors. In many of these applications, it is also desirable to maintain aseptic conditions while the connections are being made and broken. This is particularly true in the medical field.

For example, during Continuous Ambulatory Peritoneal Dialysis (CAPD), a series of connections must be made four times a day between tubing which communicates with the peritoneal cavity and a source of peritoneal dialysis solution. Substantially sterile or aseptic techniques should be followed, if the risk of peritonitis is to be minimized. In many cases, patients undergoing CAPD lack dexterity and/or are physically debilitated, making it all the more difficult to make the connections and disconnections in the proper manner.

In response to this, automatic systems for making and breaking connections in the practice of CAPD have been provided.

For example, the Steri-Track device has been used and is described in an article entitled "CAPD For the Blind" from the periodical Nephrology Nurse, March/April 1981, pp. 53-54.

Other devices for making and breaking connections in the practice of CAPD are disclosed in US-A-4500788 and US-A-4541829.

WO-A-84/02849 discloses a device for sequentially uncoupling first and third mating connectors and then forming a new coupling between the third connector and a second mating connector, the device comprising a housing, a first holder on the housing for carrying the first connector, a second holder on the housing for carrying the second connector, a third holder on the housing for carrying the third connector, and actuable means for moving the third holder from an advanced position in operative alignment with the first holder, for carrying the first and third connectors in coupled relationship, to a retracted position in which the first and third connectors are uncoupled, the third holder being movable to a second position in alignment with the second holder to permit coupling of the third connector with the second connector.

The present invention is characterised by first retaining means biasing the third holder to the first position, and second retaining means operative in response to movement of the third holder from its advanced position to its retracted position to deflect the holder against the bias of the first retaining means into the second position, the third holder being movable in its second position back towards an advanced position for coupling the second and third connectors, said first retain-

ing means automatically returning the third holder to its first position upon removal of the coupled second and third connectors from their respective holders.

Other features and advantages of the invention will be pointed out in, or will be apparent from, the specification and claims, as will obvious modification of the embodiments shown in the drawings.

### Brief Description of the Drawings

Fig. 1 is an assembled perspective view of a connection device which embodies the features of the invention;

Fig. 2 is an exploded perspective view of the device shown in Fig. 1;

Fig. 3 is a further exploded perspective view of the shuttle and associated holder of the device shown in Fig. 2;

Fig. 4 is a top view of the device shown in Fig. 1 with the cover closed, a portion of which has been broken away, with the holder located in its first and advanced positions closely adjacent to and aligned with another holder located on the device;

Fig. 5 is a top view of the device shown in Fig. 1 with the cover closed, a portion of which has been broken away, with the holder located in its second and retracted positions separated from and aligned with yet another holder located on the device;

Fig. 6 is an end view of the device, showing the cooperative relationship between the handle and the cover of the device; and

Figs. 7 through 11 are top views of the device showing its operation during a typical CAPD exchange procedure.

Before explaining the embodiments of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of components as set forth in the following description or as illustrated in the accompanying drawings. The invention is capable of other embodiments and of being practised or carried out in various ways. Furthermore, it is to be understood that the phraseology and terminology employed are for the purpose of description and should not be regarded as limiting.

### Description of the Preferred Embodiments

A device 10 for making and breaking connections between mating connection members is shown in the drawings. The device 10 can be used in a diverse number of environments both in the medical field and elsewhere. In the illustrated embodiment, the device is shown in the context of being used in the practice of CAPD.

Referring first to Figs. 1 and 2, the device 10 includes a housing 12 having a base 14 and four upstanding sidewalls 16, 18, 20, and 22. An interior cavity 24 is formed having an open top 26.

A cover 28 is attached by a hinge 30 along one of the sidewalls 20. The cover 28 is movable between opened and closed positions. In the

opened position (as shown in Fig. 1), access into the confines of the interior cavity 24 is permitted. In the closed position (as shown in Figs. 2, 4 and 5), such access is prevented. A latch 32 is provided for releasably holding the cover 28 in its closed position.

Legs 25, each preferably with a gripping mechanism such as suction cups, hold the device 10 in place during use.

The housing 12 can be made of various materials and formed by various means. For example, it can be formed of molded plastic parts. Alternately, it can be formed of machined metal parts, or a combination of metal or plastic parts. The housing is preferably sized to be conveniently carried in one hand.

The device 10 receives and holds three mating connectors. In use, the device 10 breaks the connection between two of the connectors and forms a new connection between one of the parted connectors and the remaining third connector.

The particular configuration of the device 10 will vary according to the type of connectors used. In the illustrated embodiment (see, in particular, Fig. 7), two of the mating connectors comprise tubular sleeves which are attached to solution containers 38 and 40. These sleeves define access ports 34 and 36 for the associated solution containers 38 and 40.

Also in the illustrated embodiment, the other one of the mating connectors comprises a conventional spike member 42 which is carried at the end of tubing 44. In the context of CAPD, the tubing 44 communicates with the peritoneal cavity of the patient.

The spike member 42 carries a pointed end 43 which is intended to mate with either port 34 or 36. In use, the end 43 punctures a diaphragm 46 initially located in each port 34 or 36 (shown in phantom lines in port 36 in Fig. 7). Once the diaphragm 46 is pierced, the joined spike 42 and port 34 or 36 opens fluid communication between the associated solution container 38 or 40 and the peritoneal cavity of the patient.

Once these connections have been made, fresh peritoneal dialysis solution can be introduced into the peritoneal cavity for a desired dwell period and then drained, when spent, from the peritoneal cavity back into the original solution container 38 or 40. This exchange sequence is followed four times a day.

First and second holders 48 and 50 are arranged on the housing 12. In the illustrated embodiment, the holders 48 and 50 are both located along one of the sidewalls 16 of the housing 12, although other arrangements can be used.

The holders 48 and 50 can be variously constructed, depending upon the particular construction of the connectors they are intended to carry. In the illustrated embodiment, the holders each take the shape of a generally U-shape trough which is configured to receive an annular flange 52 formed on the ports 34 and 36 (see, for example, Fig. 7).

The first and second holders 48 and 50 can be situated on the housing 12 in various ways. In the illustrated embodiment, the axes of the first and second holders 48 and 50 are disposed generally at an acute angle to each other. Because of this, the portion of the sidewall 16 in which the first holder 48 is located is angled relative to the portion of the sidewall 16 in which the second holder 50 is located.

A third holder 54 is also located on the housing 12. In accordance with one aspect of the invention, the third holder 54 is movable toward and away from the holders 48 and 50. In the context of the illustrated embodiment, the third holder 54 moves in a linear path transversely within the interior cavity 24 transversely between the sidewalls 16 and 18 between an advanced, or forward, position and a retracted, or rearward, position. In the forward position (see Fig. 4), the third holder 54 is adjacent to the sidewall 16 and the holders 48 and 50 formed thereon. In the rearward position (see Fig. 5), the third holder 54 is closely adjacent to sidewall 18, spaced away from the sidewall 16 and thus separated from the associated holders 48 and 50.

The third holder 54 can be variously constructed, again depending upon the particular construction of the associated connector. In the illustrated embodiment, the third holder 54 is configured to receive and hold the spike member 42 with the pointed end 43 of the spike member 42 generally facing in the direction that the holder 54 is moved into its forward position. The sidewall 18 of the housing includes an opening 51 through which the tubing 44 associated with the spike member 42 passes into the confines of the housing cavity 24.

Movement of the third holder 54 inside the interior cavity 24 of the housing 12 can be variously accomplished. In the illustrated embodiment, the third holder 54 is carried by a shuttle 56. The shuttle 56 is movable between the forward position and the rearward position.

A mating rack 58 and gear 60 move the shuttle 56. The rack 58 is attached to and moves with the shuttle 56. The gear 60 is mounted on the base 14 of the housing 12 (see Fig. 2).

The gear 60 rotates about a shaft 62, which terminates in a handle 64. As the handle 64 is rotated, the gear 60 also rotates, and the rack 58 is moved. The attached shuttle 56 thus moves transversely in a linear path between the already described forward and rearward position.

The third holder 54 is also movable in another path relative to the holders 48 and 50. More particularly, the third holder 54 is movable between a first position (shown in Fig. 4), in which the front edge 55 of the third holder 54 is generally pointed toward the first holder 48, and a second position (shown in Fig. 5), in which the front edge 55 of the third holder 54 is generally pointed toward the second holder 50.

While this manner of movement can be variously accomplished, in the illustrated embodiment (see Fig. 3), the third holder 54 includes a

pivot pin 66 attached by a screw 68 to the shuttle 56. The third holder 54 thus rotates about this pivot pin 66 between the heretofore described first and second positions.

Thus, in the illustrated embodiment, the third holder 54 moves between its forward and rearward positions in a linear path which is transverse its axis of rotation (i.e., pivot pin 66) between its first and second positions.

It should be appreciated that, alternatively, the third holder 54 can be moved in a linear path between its first and second position, depending upon the particular relative placement of the holders 48, 50, and 54.

In accordance with another aspect of the invention, when the third holder 54 occupies its forward position, the holder 54 is retained in its first position. The third holder 54 is thus situated in closely adjacent alignment with the first holder 48 (see Fig. 4).

The third holder 54 can be retained in its first position in various ways. In the illustrated embodiment (see Fig. 3), a torsion spring 70 is used. One end 70a of the torsion spring 70 is fitted within a hole 71 drilled in the shuttle 56, while the other end 70b of the torsion spring 70 is in operative engagement with the third holder 54. The torsion spring 70 is in a relaxed state when the holder 54 is in its first position (see Fig. 4). Movement of the holder 54 toward the second position (see Fig. 5) places the torsion spring 70 in tension. The torsion spring 70 thus serves to bias the third holder 54 toward its first position.

In accordance with another aspect of the invention, as the third holder 54 is moved from its forward position into its rearward position, the third holder 54 is moved from its first position into its second position. Thus, when the third holder 54 is in its rearward position, the third holder 54 is situated in a separated and aligned relationship with the second holder 50 (see Fig. 5).

While this mechanism can be variously accomplished, in the illustrated embodiment, a leaf spring 72 is attached to the sidewall 18 and extends into the interior cavity 24 of the housing 12. When the third holder 54 is in its forward position, the leaf spring 72 is held by a pin 74 carried by the shuttle 56 away from operative contact with the third holder 54. The torsion spring 70 thus acts without interference to bias the third holder 54 toward its first position, as shown in Fig. 4.

However, as the third holder 54 is moved from its forward position toward its rearward position (see Fig. 5), the shuttle pin 74 is moved progressively along and ultimately away from contact with the leaf spring 72. At the same time, the third holder 54 is moved into progressive operative contact with the leaf spring 72. The force of the leaf spring 72 is such that it overcomes the force of the torsion spring 70. The third holder 54 is thus progressively displaced by the leaf spring 72 from its first position toward its second position against the action of the torsion spring 70. When the third holder 54 has reached its rearward

position, the holder 54 is held in its second position between the leaf spring 72 and a shoulder 57 formed on the shuttle 56. In this position, the third holder 54 is mutually aligned with the second holder 50 (see Fig. 5).

The operation of the device 10 in the context of a CAPD exchange procedure will now be described, with reference principally to Figs. 7 to 11.

During the course of a typical CAPD exchange procedure, the patient first drains spent dialysis solution from his or her peritoneal cavity into the empty bag 38 through the connection already formed between the coupled first and third connectors 34 and 42. The first and third connectors 38 and 42 were initially coupled together when the bag 38, then full of fresh peritoneal dialysis solution, was first connected to the tubing 44 to introduce the fresh solution into the peritoneal cavity.

After bag 38 is filled with the spent solution, a clamp 76 is attached to close off the port connector 34.

The patient now commences to use the device 10 to disconnect the bag 38 of spent solution from the spike member 42 and to connect to the same spike member 42 the bag 40 of fresh solution.

As shown in Fig. 7, with the third holder 54 in its forward position, the cover 28 is opened, and the patient loads the still-coupled first and third connectors 34 and 42 into the first and third holders 48 and 54. Because the third holder 54 is retained by its normal bias in its first position (as shown in Fig. 7), and because the two holders 48 and 54 are now also closely adjacent to each other, the first and third connectors 34 and 42 can be conveniently loaded while in a coupled relationship into the device 10. Absent movement of the third holder 54, the connectors 34 and 42 are held in this coupled relationship.

As shown in Fig. 7, while the cover 28 is still open, the second connector 36 is also placed into the second holder 50. The second connector 36 is associated with the bag 40 of fresh peritoneal dialysis solution. A clamp 78 is attached to initially close off the port tube, which is also internally sealed by the diaphragm 46.

The cover 28 is now closed, enclosing the connectors 34, 36, and 42 within the confines of the housing 12.

Now, as shown in Fig. 8, the third holder 54 is moved from its forward position toward its rearward position. As the third holder 54 first begins to move away from the first holder 48, the leaf spring 72 still rests against the pin 74. The holder 54 is thus still biased, due to the torsion spring 70, toward its first position. The relative movement between the two connectors 34 and 42 at this point thus serves to pull the connectors 34 and 42 apart.

However, once the connection is broken and advancement of the third holder 54 continues, the pin 74 is eventually moved away from the leaf spring 72. Progressive contact is made between the third holder 54 and the leaf spring 72. The

third holder 54 is moved by the leaf spring 72, overcoming the action of the torsion spring 70, from its first position toward its second position. When the third holder 54 reaches its rearward position, the third connector 42 has been aligned with the second connector 36, the two connectors 36 and 42 still being in an uncoupled relationship.

Now, as shown in Fig. 9, the third holder 54 is next moved from its rearward position back toward its forward position. As seen in Fig. 9, contact between the pin 74 and the leaf spring 72 does not occur until the tip 43 of the third connector 54 enters the second connector 36. Thus, until the desired degree of engaging contact is made between the two connectors 36 and 42, the leaf spring 72 continues to bear against the third holder 54, retaining it in its second position in the desired alignment with the second holder 50.

Now, as shown in Fig. 10, further advancement of the third holder 54 into its forward position completes the connection between the third connector 42 and the second connector 36, causing the spike tip 43 to pierce the diaphragm 46. During this operation, the leaf spring 72 is completely lifted away from the third holder 54 by the pin 74. At this point, the interlocked relationship between the second and third connectors 36 and 42 still holds the third holder 54 in its second position against the action of the torsion spring 70.

Now as shown in Fig. 11, the cover 28 is opened, and the coupled second and third connectors 36 and 42 are removed from the device 10. Upon their removal, the third holder 54 automatically returns back to its first position by the action of the torsion spring 70, which now unopposed.

The patient can now proceed to open the clamp 78 and introduce the fresh dialysis solution from the bag 40 into his or her peritoneal cavity through the now connected second and third connectors 36 and 42. The other bag 38 and associated connector 36 is also removed and discarded.

A CAPD exchange procedure using the device 10 is now complete. As can be seen in Fig. 11, due to the features of the invention, the device 10 has automatically readied itself for use in another exchange procedure, following the same sequence of operation just described.

Preferably, as above described, the cover 28 should be closed while the connections are being broken and remade. To assure this, in the preferred embodiment, the handle 64 and cover 28 cooperate to require the operation to close the cover 28 before the handle 64 can be manipulated to move the third holder 54. More particularly, as shown in Fig. 6, when the cover 28 is opened, it will prevent the movement of the handle 64 required to operate the device 10. Thus, the operator is not able to operate the device 10 to manipulate the connectors unless the cover 28 is closed.

Also in the preferred embodiment, as shown in

Fig. 1, the cover 28 includes a series of shoulders 80 formed along the predetermined tracks of movement of the third holder 54 within the housing 12. These shoulders 80 prevent accidental dislodgement of the connectors out of their respective holders 48, 50, and 54 during use, for example, should the device 10 be accidentally turned on its side or upside down.

If desired, a source of ultraviolet radiation (not shown) may be placed within the interior cavity 24 of the device 10 to provide a sterilizing function.

Various features of the invention are set forth in the following claims.

#### Claims

1. A device for sequentially uncoupling first and third mating connectors (34, 42) and then forming a new coupling between the third connector (42) and a second mating connector (46), the device comprising a housing (12), a first holder (48) on the housing for carrying the first connector (34), a second holder (50) on the housing for carrying the second connector (46), a third holder (54) on the housing for carrying the third connector (42), and actuable means (64) for moving the third holder (54) from an advanced position in operative alignment with the first holder (48), for carrying the first and third connectors (34, 42) in coupled relationship, to a retracted position in which the first and third connectors are uncoupled, the third holder (54) being movable to a second position in alignment with the second holder (50) to permit coupling of the third connector (42) with the second connector (46) characterised by:

first retaining means (70) biasing the third holder (54) to the first position, and

second retaining means (72) operative in response to movement of the third holder (54) from its advanced position to its retracted position to deflect the holder against the bias of the first retaining means into the second position,

the third holder being movable in its second position back towards an advanced position for coupling the second and third connectors (42, 46),

said first retaining means (70) automatically returning the third holder (54) to its first position upon removal of the coupled second and third connectors from their respective holders.

2. A device according to Claim 1, including pin means (74) operatively associated with said second retaining means (72) so as to prevent deflection of the third holder (54) by the second retaining means during movement of the third holder from its advanced position towards its retracted position until after the third holder has been advanced sufficiently towards the retracted position to uncouple the first and third connectors (34, 42) and so as to terminate the action of the second retaining means against the bias of the first retaining means during movement of the third holder from its retracted position towards its advanced position when said third holder has been advanced sufficiently towards the advanced

position to cause contact between the second and third connectors, whereby, in use, the third holder is maintained in said second position by the second and third connectors as they are coupled together.

3. A device according to Claim 1 or 2, wherein the second retaining means includes a leaf spring (72) biasing the third holder (54) to its second position and whose bias overcomes that of the first retaining means.

4. A device according to Claim 1, 2 or 3, wherein the first and second holders (48, 50) are located on a sidewall (16) of the housing (12), the first holder (48) having its axis located at an acute angle relative to the axis of the second holder (50).

5. A device according to any preceding claim, wherein said housing includes two oppositely spaced sidewalls (16, 18) the first and second holders (48, 50) being located on one of these sidewalls (16), and wherein the third holder (54) is movable between said sidewalls, the advanced position being generally adjacent to said one of these sidewalls (16) and the retracted position being generally adjacent to the other sidewall (18).

6. A device according to any preceding claim wherein said third holder (54) rotates about a rotational axis (66) between said first and second positions.

7. A device according to Claim 6, wherein the first retaining means includes a torsion spring (70).

8. A device according to any preceding claim wherein the third holder is carried by a shuttle (56), the shuttle being movable for moving the third holder (54) between said advanced and retracted positions, and wherein the third holder is movable relative to the shuttle between its first and second positions.

9. A device according to Claim 8 as appendant to Claims 6 or 7 wherein the shuttle is movable in a linear direction transverse of the rotational axis (66) of the third holder.

#### Patentansprüche

1. Vorrichtung zum Abkoppeln eines ersten und dritten Paßverbindungsstutzens (34, 42) nacheinander und zur anschließenden Herstellung einer neuen Schlauchverbindung zwischen dem dritten Verbindungsstutzen (42) und einem zweiten Paßverbindungsstutzen (46), welche ein Gehäuse (12), eine erste Halterung (48) auf dem Gehäuse zur Aufnahme des ersten Verbindungsstutzens (34), eine zweite Halterung (50) auf dem Gehäuse zur Aufnahme des zweiten Verbindungsstutzens (46), eine dritte Halterung (54) auf dem Gehäuse zur Aufnahme des dritten Verbindungsstutzens (42) und eine betätigbare Einrichtung (64) aufweist, mit welcher die dritte Halterung (54) aus einer vorgeschobenen Stellung in wirksamer Ausrichtung zur ersten Halterung (48), in welcher der erste und dritte Verbindungsstutzen (34, 42) miteinander gekoppelt sind, in eine zurückgescho-

bene Stellung bewegbar ist, in welcher der erste und dritte Verbindungsstutzen abgekoppelt sind, wobei die dritte Halterung (54) in eine zweite Stellung bewegbar ist, in welcher sie zur zweiten Halterung (50) so ausgerichtet ist, daß der dritte Verbindungsstutzen (42) mit dem zweiten Verbindungsstutzen (46) koppelbar ist, gekennzeichnet durch:

eine erste Sicherungseinrichtung (70), welche die dritte Halterung (54) in die erste Stellung spannt, und

eine zweite Sicherungseinrichtung (72), welche im Ansprechen auf die Bewegung der dritten Halterung (54) aus ihrer vorgeschobenen Stellung in ihre zurückgeschobene Stellung in der Weise wirksam ist, daß sie die Halterung gegen die Vorspannung der ersten Sicherungseinrichtung in die zweite Stellung auslenkt,

wobei die dritte Halterung in ihrer zweiten Stellung zum Ankoppeln des zweiten und dritten Verbindungsstutzens (42, 46) zu einer vorgeschobenen Stellung hin zurückbewegbar ist,

während nach dem Lösen des angekoppelten zweiten und dritten Verbindungsstutzens aus der jeweiligen Halterung die erste Sicherungseinrichtung (70) automatisch die dritte Halterung (54) in ihre erste Stellung zurückführt.

2. Vorrichtung nach Anspruch 1, mit einer der zweiten Sicherungseinrichtung (72) wirksam zugeordneten Stifteinrichtung (74), welche ein Ausbiegen der dritten Halterung (54) durch die zweite Sicherungseinrichtung während der Bewegung der dritten Halterung aus ihrer vorgeschobenen in ihre zurückgeschobene Stellung so lange verhindert, bis die dritte Halterung um einen ausreichenden Abstand in ihre zurückgeschobene Stellung zum Abkoppeln des ersten und dritten Verbindungsstutzens (34, 42) bewegt wurde, und damit die Einwirkung der zweiten Sicherungseinrichtung entgegen der Vorspannung der ersten Sicherungseinrichtung während der Bewegung der dritten Halterung aus ihrer zurückgeschobenen Stellung in ihre vorgeschobene Stellung beendet, wenn die dritte Halterung um einen ausreichenden Abstand in die vorgeschobene Stellung vorwärtsbewegt wurde, um die Berührung zwischen dem zweiten und dritten Verbindungsstutzen herbeizuführen, wobei im Betrieb der zweite und der dritte Verbindungsstutzen während ihrer gegenseitigen Ankopplung dritte Halterung in der zweiten Stellung halten.

3. Vorrichtung nach Anspruch 1 oder 2, bei welcher die zweite Sicherungseinrichtung eine Blattfeder (72) aufweist, welche die dritte Halterung (54) in ihre zweite Stellung spannt und deren Spannkraft die Spannkraft der ersten Sicherungseinrichtung überwindet.

4. Vorrichtung nach Anspruch 1, 2 oder 3, bei welcher sich die erste und die zweite Halterung (48, 50) auf einer Seitenwandung (16) des Gehäuses (12) befinden, wobei die Achse der ersten Halterung (48) unter einem spitzen Winkel zur Achse der zweiten Halterung (50) verläuft.

5. Vorrichtung nach einem der vorhergehenden Ansprüche, bei welcher das Gehäuse zwei einan-

der gegenüberliegende und voneinander beabstandete Seitenwandungen (16, 18) aufweist, wobei die erste und die zweite Halterung (48, 50) auf einer dieser Seitenwandungen (16) angeordnet sind, und bei welcher die dritte Halterung (54) zwischen den Seitenwandungen bewegbar ist, wobei die vorgeschobene Stellung im wesentlichen nahe einer dieser Seitenwandungen (16) und die zurückgeschobene Stellung im wesentlichen nahe der anderen Seitenwandung (18) liegt.

6. Vorrichtung nach einem der vorhergehenden Ansprüche, bei welcher die dritte Halterung (54) um eine Drehachse (66) zwischen der ersten und zweiten Stellung drehbar ist.

7. Vorrichtung nach Anspruch 6, bei welcher die erste Sicherungseinrichtung eine Torsionsfeder (70) aufweist.

8. Vorrichtung nach einem der vorhergehenden Ansprüche, bei welcher die dritte Halterung auf einem hin und herschiebblichen Träger (56) gelagert ist, welcher zum Bewegen der dritten Halterung (54) zwischen der vorgeschobenen und der zurückgeschobenen Stellung bewegbar ist, und bei welcher die dritte Halterung zwischen ihrer ersten und zweiten Stellung gegenüber dem Träger bewegbar ist.

9. Vorrichtung nach Anspruch 8 und in Ergänzung zu Anspruch 6 bzw. 7, bei welcher der hin- und herschiebbliche Träger in linearer Richtung quer zur Drehachse (66) der dritten Halterung bewegbar ist.

#### Revendications

1. Dispositif pour successivement désaccoupler des premier et troisième connecteurs (34, 42) conjugués puis former un nouvel accouplement entre le troisième connecteur (42) et un second connecteur conjugué (46), le dispositif comprenant un boîtier (12), un premier support (48) sur le boîtier pour supporter le premier connecteur (34), un second support (50) sur le boîtier pour supporter le second connecteur (46), un troisième support (54) sur le boîtier pour supporter le troisième connecteur (42), et des moyens (64) actionnables pour déplacer le troisième support (54) d'une position avancée en alignement fonctionnel avec le premier support (48), pour supporter les premier et troisième connecteurs (34, 42) en relation d'accouplement, vers une position reculée dans laquelle les premier et troisième connecteurs sont désaccouplés, le troisième support (54) étant déplaçable vers une seconde position alignée avec le second support (50) afin de permettre l'accouplement du troisième connecteur (42) avec le second connecteur (46), caractérisé par:

des premiers moyens de retenue (70) poussant le troisième support (54) vers la première position, et

des seconds moyens de retenue (72) agissant en réponse au déplacement du troisième support (54) de sa position avancée vers sa position reculée pour défléchir vers la seconde position le support à l'encontre de la poussée des premiers moyens de retenue,

le troisième support étant déplaçable dans sa seconde position pour retourner vers une position avancée afin d'accoupler les second et troisième connecteurs (42, 46),

lesdits premiers moyens de retenue (70) faisant automatiquement revenir le troisième support (54) vers sa première position après enlèvement des second et troisième connecteurs accouplés de leurs supports respectifs.

2. Dispositif selon la revendication 1, comprenant un dispositif à goupille (74) fonctionnellement associé avec lesdits seconds moyens de retenue (72) de manière à empêcher la déflexion du troisième support (54) par les seconds moyens de retenue pendant le déplacement du troisième support de sa position avancée vers sa position reculée jusqu'à ce que le troisième support ait été suffisamment déplacé vers la position reculée pour désaccoupler les premier et troisième connecteurs (34, 42) et pour achever l'action des seconds moyens de retenue à l'encontre de la poussée des premiers moyens de retenue pendant le déplacement du troisième support de sa position reculée vers sa position avancée lorsque le troisième support a été avancé suffisamment vers la position avancée pour entraîner le contact entre les second et troisième connecteurs, moyennant quoi, en utilisation, le troisième support est maintenu dans ladite seconde position par les second et troisième connecteurs quand ils sont accouplés l'un à l'autre.

3. Dispositif selon la revendication 1 ou 2, dans lequel les seconds moyens de retenue comprennent un ressort à lame (72) poussant le troisième support (54) vers sa seconde position et dont la poussée surpasse celle des premiers moyens de retenue.

4. Dispositif selon la revendication 1, 2 ou 3, dans lequel les premiers et seconds supports (48, 50) sont situés sur une paroi latérale (16) du boîtier (12), le premier support (48) ayant son axe formant un angle aigu par rapport à l'axe du second support (50).

5. Dispositif selon l'une quelconque des revendications précédentes dans lequel ledit boîtier comprend deux parois latérales séparées et opposées (16, 18), les premiers et seconds supports (48, 50) étant situés sur l'une de ces parois latérales (16), et dans lequel le troisième support (54) est déplaçable entre lesdites parois latérales, la position avancée étant globalement adjacente cette paroi latérale (16) et la position reculée étant globalement adjacente à l'autre paroi latérale (18).

6. Dispositif selon l'une quelconque des revendications précédentes, dans lequel ledit troisième support (54) pivote autour d'un axe de rotation (66) entre lesdites première et seconde positions.

7. Dispositif selon la revendication 6, dans lequel les premiers moyens de retenue comprennent un ressort de torsion (70).

8. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le troisième support est porté par un chariot (56), le chariot étant mobile pour déplacer le troisième support (54) entre lesdites positions avancée et reculée, et

dans lequel le troisième support est mobile par rapport au chariot entre ses première et seconde positions.

9. Dispositif selon la revendication 8, prise en

dépendance des revendications 6 ou 7, dans lequel le chariot est mobile dans une direction rectiligne, transversale à l'axe de rotation (66) du troisième support.

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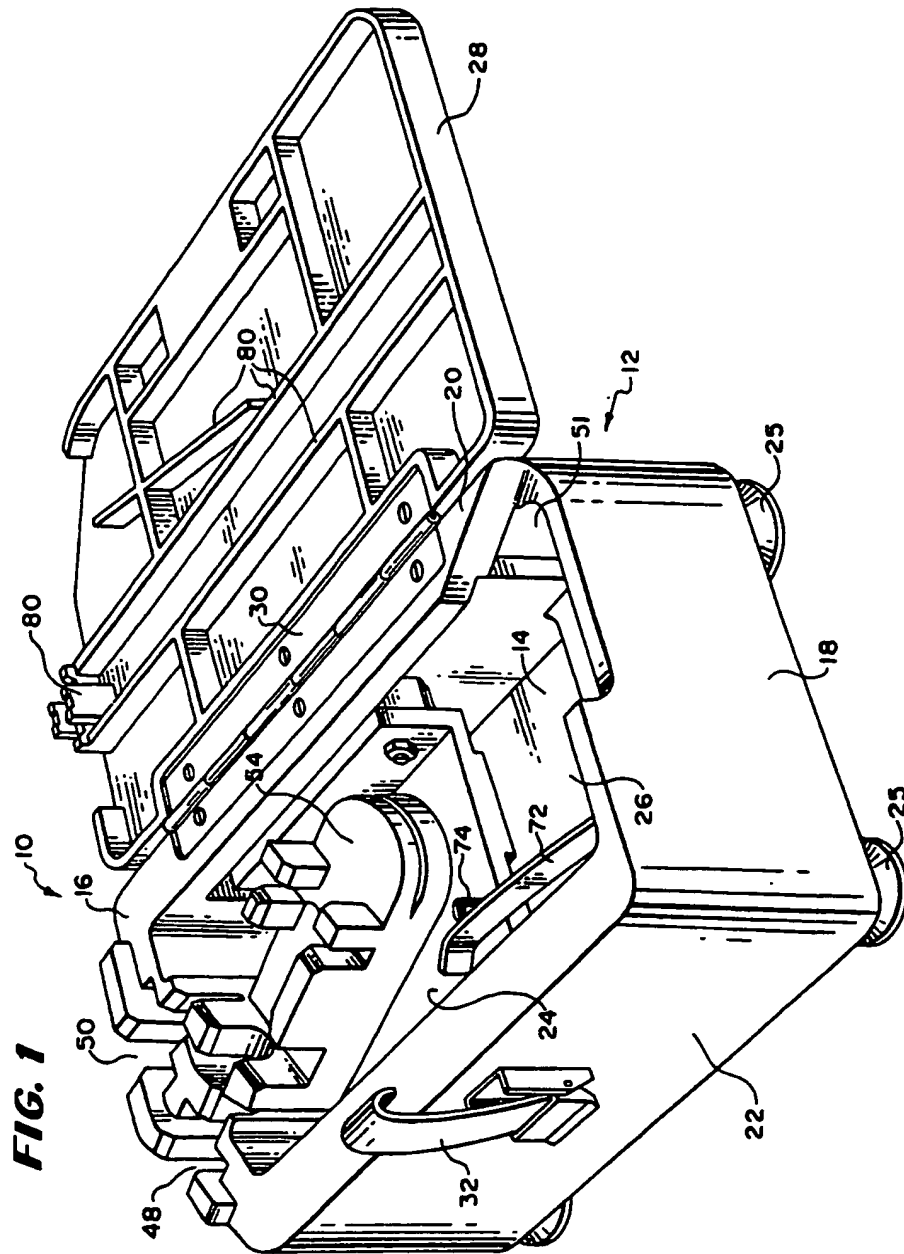
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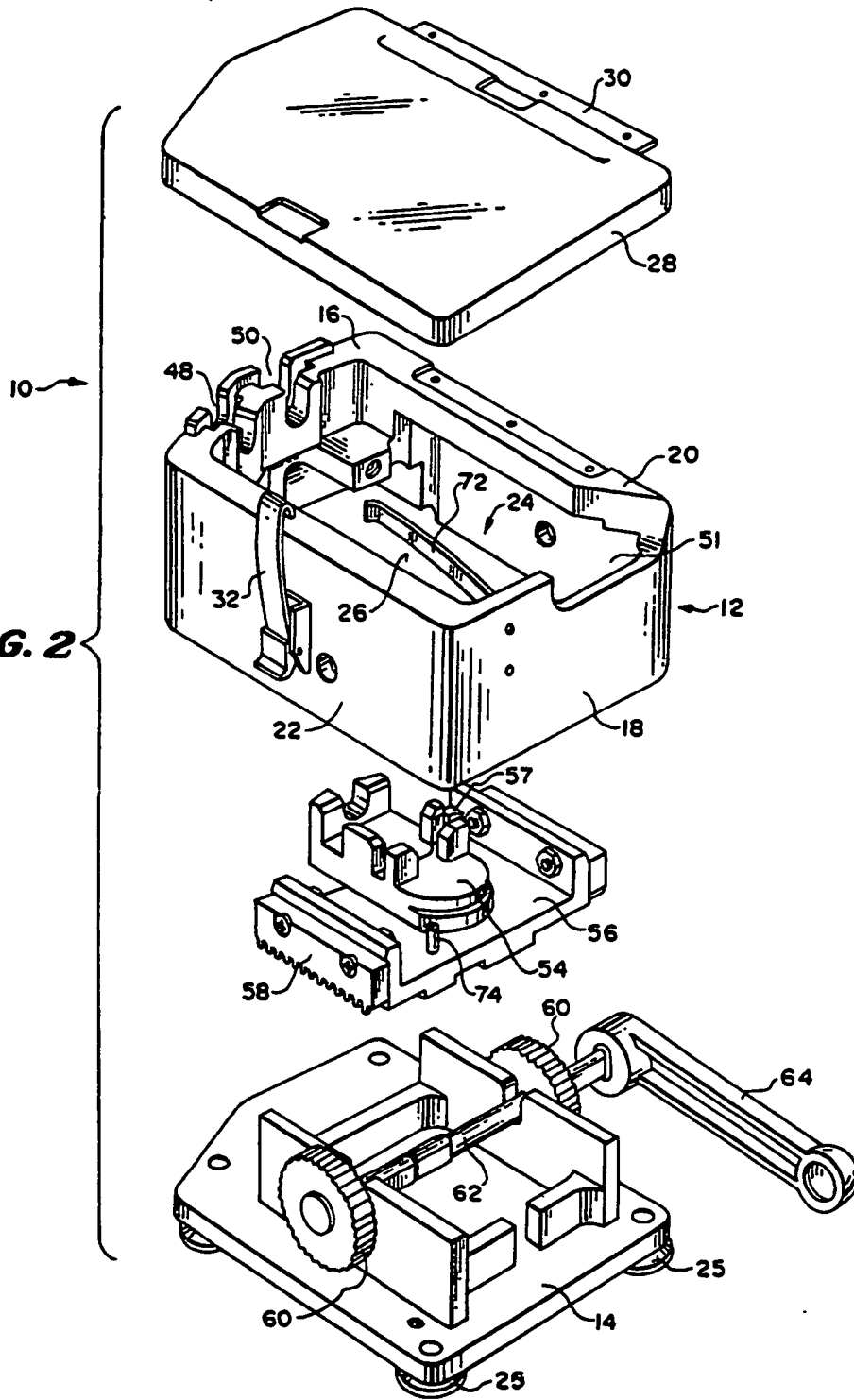
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8

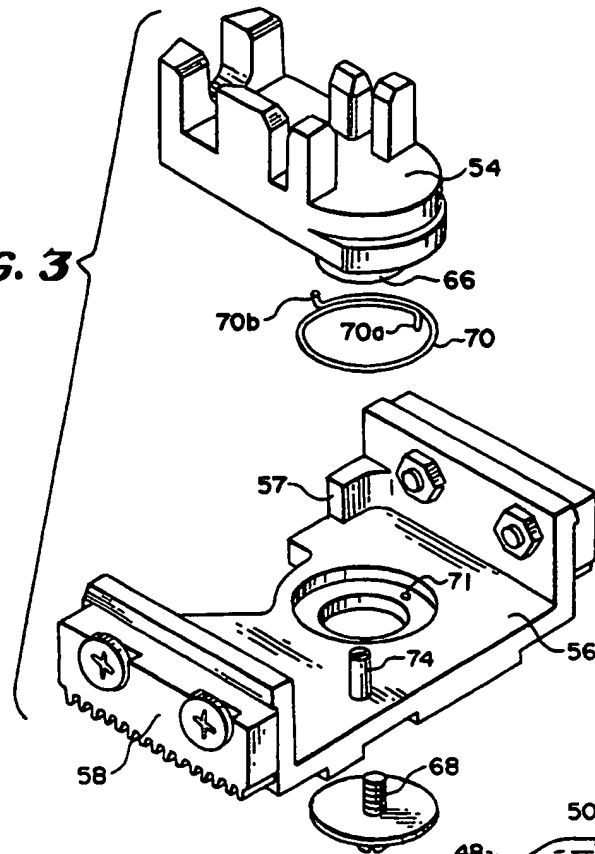




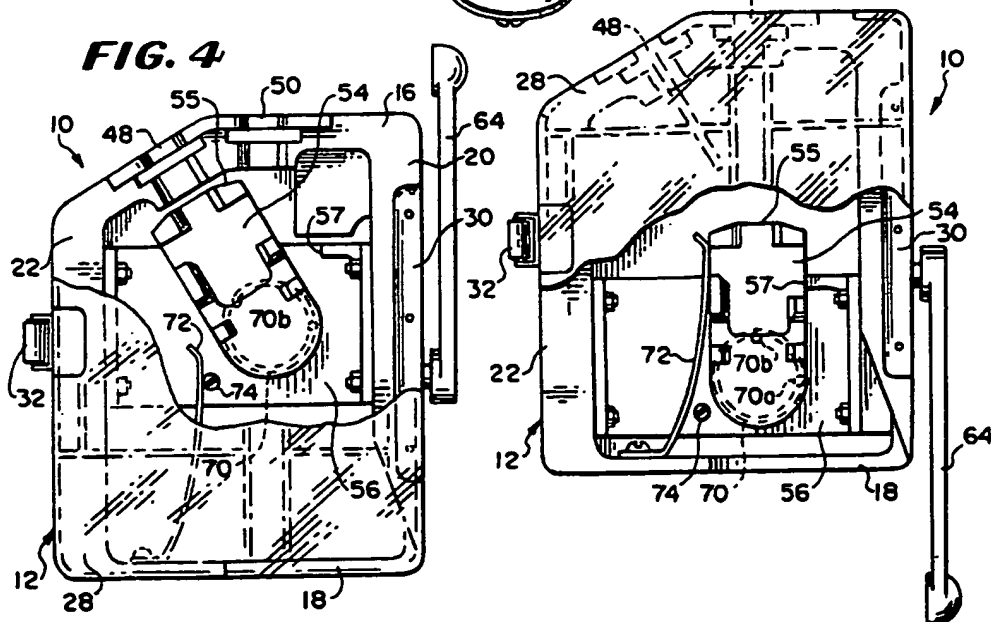
**FIG. 2**



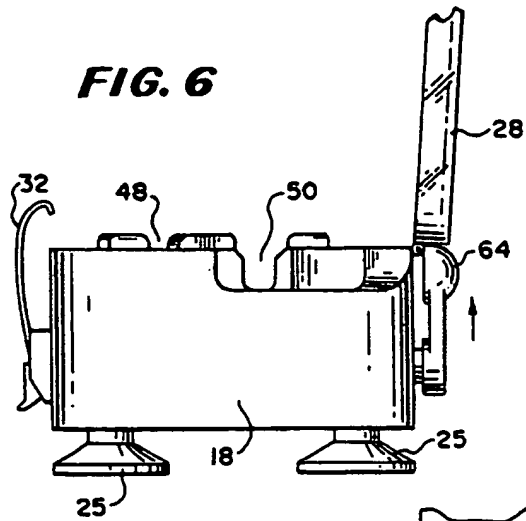
**FIG. 3**



**FIG. 5**



**FIG. 6**



**FIG. 7**

